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Exploration of the Path to Financial Digital Transformation in Higher Education: A Case Study of H University

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Abstract: Financial Intelligence (FI) is a new generation of finance that has continuously developed in the process of financial digitization and intelligent application. With the deepening of the connotative construction of financial management in higher education institutions and the innovative application of intelligent technologies in the digital era, the financial management in higher education institutions is gradually transitioning towards digitization and intelligence. This article analyzes the intrinsic logic of constructing intelligent financial systems in higher education institutions. Based on the practical exploration of financial information system construction at H University, the content and path of constructing the university's financial information system are examined. The article delves into profound reflections and analyses on the construction of financial information systems and the development of digital transformation in higher education institutions. The aim is to provide insights and references for enhancing the financial service capabilities, improving governance systems, and advancing the modernization of governance capabilities in higher education institutions.

Keywords: Higher education; Financial intelligence; System architecture.

1. Introduction

In the era of digitalization where new technologies such as "smart cloud, mobile, and IoT" are surging, the application of digital and intelligent technologies continues to push the boundaries of finance. The "Information Technology-Driven Financial Industry Transformation" summit, hosted by the Shanghai National Institute of Accounting, unveiled the top ten information technologies influencing Chinese accounting professionals in 2021. These technologies include Financial Cloud, Electronic Invoices, Accounting Data Analysis and Processing Technology, Electronic Accounting Archives, Robot Process Automation (RPA), Next-Generation ERP, Mobile Payments, Data Mining, Intelligent Data Center, and Intelligent Process Automation (IPA). In November 2022, the launch of the ChatGPT artificial intelligence chatbot program by the U.S. Artificial Intelligence Research Laboratory, OpenAI, also sparked significant attention in the financial industry. Against this backdrop, financial digitization and intelligence (Financial Intelligence, FI) have become hot topics in academic research and practical exploration both domestically and internationally.

2. The Intrinsic Logic of Financial Intelligence in Higher Education Institutions

2.1 The Essence of Financial Intelligence in Higher Education Institutions

Digitization is based on existing informatization to realize the digitization of data and transform business processes into data flows, driving business with data. Intelligentization combines computer computing power to provide management decisions with algorithmic recommendations based on machine learning, achieving optimal action choices and gaining insights from data. The essence of financial intelligence in higher education institutions is to enhance financial management efficiency through the combination of artificial intelligence and intelligent tools. Exploring the transformation path of financial intelligence in higher education involves not only the construction of innovative intelligent financial platforms but also the establishment of a new financial management model supported by these platforms. This extends financial services to other business areas, achieving data interconnection and sharing with departments such as personnel, academic affairs, networks, and planning. More importantly, it involves the transformation from accounting-oriented accounting to management-oriented accounting, facilitating strategic decision-making in higher education institutions and enhancing management efficiency and service capabilities.

2.2 Core Elements for Achieving Financial Intelligence in Higher Education Institutions

Before establishing an intelligent financial decision-making system in higher education institutions, it is essential to clarify the three core elements for achieving intelligent financial decision-making: data governance, business process optimization, and scenario applications.

2.2.1 Data governance establishes the data foundation for financial intelligence in higher education institutions

Big data serves as the raw material for intelligent financial decision-making in higher education. Without sufficient big data, the existence of financial intelligent decision-making tools alone cannot generate valuable applications. Data governance involves the unified planning, organization, standardization, and control of financial and business data to ensure the accuracy, consistency, and completeness of data. It provides a solid data foundation for financial intelligence. Massive data alone cannot effectively support decision-making. The collected raw data needs to undergo cleaning, classification, summarization, and other processes using advanced data processing technologies and tools such as big data processing platforms and data warehouses. This results in the integration of internally and externally valuable information with clear objectives and high value density, providing accurate and real-time data support for subsequent financial analysis.

Effective data governance requires a clear understanding of the distribution of confidential and sensitive data, the determination of a U/C matrix for sensitive data, and the restriction of all inappropriate access and updates to data. Data governance should span the entire lifecycle of data, establishing corresponding control points and management processes at each stage of data planning, design, creation, storage, use, and destruction.

2.2.2 Business process optimization is a key guarantee for achieving financial intelligence

Optimizing financial business processes in higher education institutions includes financial accounting, budget management, fee management, and more. Business process optimization in higher education institutions involves the construction of an integrated intelligent financial accounting platform based on the analysis of its value goals and the refinement of business processes. This platform, by integrating university information resources, combines internal management activities and external information to provide foundational data for financial accounting and management. The data warehouse extracts, transforms, and loads data from source ends to create a large amount of decision-supporting data. Subsequently, data mining techniques utilize various algorithms to extract implicit information and knowledge from the data.

Utilizing models and methods such as strategic forecasting and decision-making, budgeting and control, financial analysis, and performance evaluation, business process optimization mines and analyzes data from both the institution's business and financial sectors, as well as the broader education industry and macroeconomic data. Finally, the analysis results are presented through human-computer interaction systems. Business process optimization, through streamlining, simplifying, and automating financial management processes, can reduce manual intervention and error rates, thereby enhancing the level and efficiency of financial management.

2.2.3 The application of financial intelligence is the implementation path for intelligent financial decision-making in higher education institutions

The intelligent financial decision-making system in higher education institutions requires a profound understanding of the pain points and needs of financial personnel and other business personnel. It involves leveraging the characteristics and advantages of intelligent technologies to implement decision support and other management accounting functions, thereby maximizing management efficiency.

(1) In the aspect of comprehensive budget management, leveraging big data can enhance the capability for forecasting and resource allocation. With the use of financial intelligence technology, exploring the performance drivers of various business aspects in higher education institutions, linking these drivers to value creation, and establishing predictive models with machine learning (or deep learning) algorithms can be achieved.

(2) In the aspect of cost and expense control, with the integration of business and finance, the business systems and financial systems in higher education institutions will gradually achieve data interoperability. The unified accounting engine, serving as a carrier, will also be integrated into multiple frontend business management systems. This integration will drive the forward extension of the financial control chain in higher education institutions.

(3) In the aspect of risk monitoring, higher education institutions, with large amounts of funds, diverse project types, and complex approval processes, often store traditional financial data in a non-structured manner. Relying solely on manual efforts makes it difficult to implement direct and precise risk interception. Big data, by incorporating unstructured data and conducting correlation analysis, enables proactive warning of potential risks or fraudulent activities.

3. Implementation Path of Financial Intelligence in Higher Education Institutions—Taking H University as an Example

The following will focus on the practical implementation of financial informatization at H University, elaborating on the implementation path of financial intelligence in higher education institutions in detail from the following three aspects.

3.1 Improving the Financial Management Structure of H University

In terms of professional division of financial work, H University can be essentially categorized into three main levels: strategic finance, operational finance, and shared finance. Strategic finance governs H University's budgeting, final accounting, performance evaluation, and other strategic decisions. Operational finance constitutes a crucial pillar in integrating business and finance, facilitating information exchange between H University's finance department and academic departments, as well as functional departments. It provides comprehensive support for financial planning,

budgeting, and process control to the management. Shared finance offers a centralized data foundation for the financial decision-making system, achieving standardization of data and processes across various business units at H University through intelligent sharing operations. It accomplishes fundamental accounting and operations, providing centralized and efficient financial services.

3.2 Establishing an Intelligent Financial Decision Support System for H University

Creating a scientific and efficient intelligent decision support information system is a crucial step in implementing the intelligent financial decision-making system. Leveraging technologies such as big data analysis and data mining, H University, considering the characteristics of higher education financial operations, has proposed an architecture for an intelligent decision support system tailored to university finance. Supported by a vast amount of business and finance data, the intelligent financial decision support information system relies on model systems and knowledge systems. It applies artificial intelligence theories to construct relevant models for solving decision-making problems.

In terms of functional architecture, H University's intelligent financial decision support system mainly comprises three levels:

(1) Data Collection Layer: Responsible for acquiring, extracting, cleaning, transforming, and storing internal business and financial data as well as external decision-related data within the university, providing data support for the entire system.

(2) Data Processing and Application Layer: Combining data mining techniques and expert systems, this layer primarily achieves knowledge extraction from databases and data warehouses, expert system reasoning to provide decision support information, and the exploration of implicit knowledge.

(3) Data Analysis and Presentation Layer: This layer combines analysis results, presenting customized content for different user needs.

3.3 Reshaping the Financial Management Model of H University

H University employs systematic and innovative thinking to reshape a new financial management model across different areas such as accounting and financial management, planning and budget management, and cross-departmental business collaboration. The goal is to achieve organic integration and coordination between different systems and processes, enabling comprehensive process management and continuous monitoring throughout the financial management cycle.

3.3.1 In the field of financial accounting and management

(1) Establishing an Integrated Financial Accounting System:

The university has created a "one-stop" financial accounting system. Since the outbreak of the COVID-19 pandemic in December 2019, the university has actively promoted the online reimbursement system. It implements online approval for financial reimbursement through the campus information portal. This portal integrates with the financial information system and continuously improves an intelligent financial accounting process. The process includes intelligent business recording, automatic data filling, online business and financial approval, accounting, payment, and archiving. It covers budget control for front-end travel applications and other procurement activities, mid-range accounting processing, and back-end electronic document management, achieving comprehensive process management for intelligent financial reimbursement.

(2) Building a Comprehensive Revenue Management Framework:

The university has integrated internal financial management systems such as the electronic receipt system, student fee system, payment platform, bill management system, contract management system, etc. It has closely connected with business systems like research management, non-degree management, academic affairs, etc. By integrating with the business and finance management system, the university has formed a comprehensive revenue management service platform. This platform encompasses record-keeping, income project initiation, confirmation, invoicing, allocation, and monitoring. It achieves automatic accounting processing and timely feedback for various incomes, significantly enhancing the efficiency of financial and business departments in managing income dynamically.

(3) Establishing a Multi-Dimensional Financial Rule

Framework:

The university has constructed a comprehensive financial rule framework from various perspectives, including financial management policy, accounting rules, and foundational accounting service dimensions. This ensures the comprehensiveness and depth of financial rules, enabling adaptability to various complex financial situations.

3.3.2 In the field of budget management and planning

(1) Improving Rolling Project Repository Management:

H University, based on the school's development plan, incorporates all budget expenditures into a budget project repository. All budget management stages are based on projects, implementing full life cycle management for projects. This ensures that once the budget is approved, it can be implemented. Projects are prioritized based on urgency, emphasizing the assurance of key priorities. Simultaneously, the management mode of the project repository is optimized. Recurrent projects, ongoing projects, and budget projects applying for rollover to the next fiscal year are automatically moved to the reserve project repository.

(2) Building a Comprehensive Budget Management System Meeting Internal Management Needs:

The university establishes the School Budget Formulation Committee, with the university president serving as the director. Members include heads of various departments, such as the university office, finance, budget, disciplinary inspection, audit, state-owned asset office, logistics, technology, academic affairs, development planning, students, personnel, etc. Various colleges or departments actively participate, designating core business personnel to join the Budget Formulation Committee. They mainly complete key tasks during the stages of needs analysis and system testing. To ensure the standardization of the budget formulation process, H University specifies the functions of each module in the system design and accurately matches them with various steps of budget declaration, achieving standardized management of the school's budget formulation process.

(3) Constructing a Comprehensive Budget Performance Management System:

H University gradually establishes a budget performance indicator system, provides a budget performance indicator template, establishes a project repository management module, and integrates and connects various management stages such as project declaration, review, approval, fund allocation, budget execution, tracking and monitoring, performance evaluation, and result feedback. This reinforces a control mechanism interlocking in a forward sequence and a feedback mechanism that allows dynamic traceability in reverse.

3.3.3 In the unified decision and support domain

In the transformation of financial digitization and intelligence, the construction of a unified decision support system is considered a core objective. The financial decision support system, as a novel information system, achieves forward control by implementing a closed-loop management "from business to finance" through unified basic information standards, clear management authorization scopes, and smooth information sharing processes. H University, based on constructing the financial management decision support system, gradually provides interactive analysis and presentation of financial and related data to the management, realizing support and assurance for scientific decision-making. Starting from actual needs, the system design is guided by a business architecture approach, specifying the technical conditions required for system development, and completing the division of system functional modules and database scheme design. The core of the financial management decision support system is financial data, integrating information data from various functional departments to achieve data sharing on a data warehouse platform for various applications. Through the construction of a business logic model based on the data warehouse, data analysis processing is performed to generate various reports for management use, thereby improving work efficiency and management capabilities. By presenting various types of information to diverse users, the system facilitates the transformation from data to information and from information to knowledge. The system also features a "traceability" function to "specific voucher detail data penetration," providing timely updates on financial overviews, income and expenditure, balance, and budget data, along with warning and monitoring functions for significant funds, advances, and pre-

issued bills.

4. Conclusion

The Intelligent Transformation of Financial Management in Higher Education Institutions is an inevitable trend in the current development of financial management in universities. Starting with the three elements of data governance, business process optimization, and scenario applications, this transformation aims to enhance the level of intelligent transformation in higher education finances through three main approaches: improving the financial management framework, establishing an intelligent financial decision support system for universities, and reshaping the financial management model in higher education.

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